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ABSTRACT

In fall 1996, California's Saddleback Community College began enforcing a prerequisite mathematics course for the college's Algebra (Math 8), Statistics (Math 10), and Trigonometry (Math 124) series. The 11 memoranda collected in this report present results from a study of the effects of enforcing the prerequisite on successful completion of the three subsequent courses. Data are presented on the following topics: (1) successful completion rates in Math 8, 10, and 124 in fall 1996, compared to pre-enforcement rates in fall 1994 and fall 1995; (2) methods used by students to meet the prerequisite in fall 1996; (3) course completion rates by the method used to fulfill the prerequisite; (4) the relationships between the grade received in the prerequisite course and the subsequent math course chosen, successful completion in the subsequent course, and the number of previous attempts at the course or higher level courses; (5) for individual sections of Math 8, 10, and 124, differences in average grade received in the prerequisite course for students who completed the course at the college; (6) whether the rate of success in subsequent courses declined as the time since the completion of the prerequisite increased; (7) whether success rates declined over time for students who satisfied the prerequisite by passing an exam; (8) the relationship between scores on the prerequisite exam and success rates in Math 8, 10, or 124; and (9) the high school of origin for students fulfilling the prerequisite while in high school. (TGI)

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ED 409 052

Evaluation of Intermediate Algebra Prerequisite Enforcement at Saddleback College

Steve Sworder

Saddleback Community College

U.S. DEPARTMENT OF EDUCATION
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JC 970 368

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To: Richard McCullough, Dean
Mathematics, Science, and Engineering Division

From: Steve Sworder, Instructor
Mathematics Department

Date: January 13, 1997

Subject: Fall 1996 Mathematics Prerequisite Review Question 1:

"Was the percent of students who successfully completed Math 8, Math 10, and Math 124 higher in Fall 1996 (when the Math 253 prerequisite was enforced for the first time) than in Fall 1994 and Fall 1995?"

To answer this question we will include those students who received a grade in these courses (i.e. Math 8, College Algebra; Math 10, Statistics; Math 124, Trigonometry) and those who withdrew or were dropped after the day of the first class meeting. The students who successfully completed these courses are those who received a grade of A, B, C, CR, or I/C. The percent of those who successfully completed these courses is simply the ratio of the number who successfully completed the course to the number who were enrolled after the day of the first class session. The numbers of students in these categories along with the results of the percent calculation are shown in the tables below for the following semesters: Fall, 1994; Fall, 1995; Fall, 1996.

Math 8: College Algebra

Term	Number of Class Sections	Number of Students Enrolled	Number of Students Who Successfully Completed the Course	Percent of Students Who Successfully Completed the Course
Fall, 1994	7	375	145	38.7%
Fall, 1995	7	350	107	30.6%
Fall, 1996	4	204	87	42.6%

Math 10: Introduction to Statistics

Term	Number of Class Sections	Number of Students Enrolled	Number of Students Who Successfully Completed the Course	Percent of Students Who Successfully Completed the Course
Fall, 1994	8	389	164	42.2%
Fall, 1995	7	344	162	47.1%
Fall, 1996	4	206	112	54.4%

Math 124: Trigonometry

Term	Number of Class Sections	Number of Students Enrolled	Number of Students Who Successfully Completed the Course	Percent of Students Who Successfully Completed the Course
Fall, 1994	6	250	104	41.6%
Fall, 1995	6	265	99	37.4%
Fall, 1996	3	141	57	40.4%

Looking at the tables above, we see that both Math 8 and Math 10 showed improvement in student success rates following the enforcement of the course prerequisite. This was not the case for Math 124, where the success rate remained essentially static.

Of course, a variety of reasons lead students to withdraw from or fail to be successful in college classes. Not all of these relate to the course prerequisite. By counting withdrawals and drops after the first class day, we hopefully do not include "No Shows;" but many students are still rearranging their schedules well into the second week of classes. Further, a class schedule that seemed, at registration time, to fit perfectly with a student's work or family commitments might lose its luster after a few weeks of attendance.

As a means of removing from our success rate calculations some of the extraneous influences on students, we repeat the calculations shown above; but will exclude students who received a DR (i.e. they dropped before the 30% point in the semester) in the class. Of course, some of these students (i.e. those receiving a DR) will drop because they are having academic difficulty with the course. Further, students will stay in the course past the 30% mark and later receive a W although they are having no academic difficulty in the course. Circumstance simply require that they must place their time and energies elsewhere. Consequently, the calculations below do not perfectly isolate the academic influences on our students.

For the tables shown below we include those students who received a grade in these courses other than DR (i.e. they dropped or where dropped before the 30% point in the course). The students who successfully completed these courses are those who received a grade of A, B, C, CR, or I/C. The percent of those who successfully completed these courses is simply the ratio of the number who successfully completed the course to the number who received a grade other than DR. The numbers of students in these categories along with the result of the percent calculation are shown in the tables below for the following semesters: Fall, 1994; Fall, 1995; Fall, 1996.

Math 8: College Algebra

Term	Number of Class Sections	Number of Students Receiving a Grade Other Than DR	Number of Students Who Successfully Completed the Course	Percent of Students Who Successfully Completed the Course
Fall, 1994	7	291	145	49.8%
Fall, 1995	7	261	107	41.0%
Fall, 1996	4	173	87	50.3%

Math 10: Introduction to Statistics

Term	Number of Class Sections	Number of Students Receiving a Grade Other Than DR	Number of Students Who Successfully Completed the Course	Percent of Students Who Successfully Completed the Course
Fall, 1994	8	302	164	54.3%
Fall, 1995	7	283	162	57.2%
Fall, 1996	4	178	112	62.9%

Math 124: Trigonometry

Term	Number of Class Sections	Number of Students Receiving a Grade Other Than DR	Number of Students Who Successfully Completed the Course	Percent of Students Who Successfully Completed the Course
Fall, 1994	6	214	104	48.6%
Fall, 1995	6	221	99	44.8%
Fall, 1996	3	122	57	46.7%

Observations:

The most dramatic effect of the enforcement of the Intermediate Algebra prerequisite for the courses in College Algebra, Statistics, and Trigonometry is on the rate of completion of Statistics students. Their success rate has improved.

The rate of successful completion of the College Algebra students is only slightly improved, but still at or below 50%. Further study of these students and exactly how they are meeting the prerequisite may give insight into the cause of this low completion rate.

There was no effect on the success rate of Trigonometry students. This may be because students in the previous semesters tended to have the prerequisite even though they were not required to prove this fact prior to registration. However, the low level of completion of these students is troubling. It is possible that the trigonometry course still assumes that the student has had an extensive exposure to geometry at some point in their travels even though this is no longer the case for many students. If this were true, a curriculum change might be appropriate to insure that a student arriving with only algebra courses on their transcript could be moved successfully through the course in trigonometry.

cc: Mathematics Department

To: Richard McCullough, Dean
Mathematics, Science, and Engineering Division

From: Steve Sworder, Instructor
Mathematics Department

Date: January 15, 1997

Subject: Fall 1996 Mathematics Prerequisite Review Question 2:

"What distribution of methods available for meeting the prerequisite was used by students to enroll in Math 8, Math 10, and Math 124 for the Fall, 1996 semester?"

The population of students on which the answer to this question is based consists of those students enrolled in Math 8, Math 10, and Math 124 who did not drop on or before the day of the first class meeting. Four students changed from one of these courses to another after the first class meeting. These students are only counted as members of the course to which they transferred. Three students were enrolled simultaneously in two of these courses and they were counted for both classes (i.e. they were counted twice in this population). The size of this population is 547. The numbers enrolled in each of the courses of interest are:

Math 8	202 students
Math 10	205 students
Math 124	140 students

The numbers of students who used each of the basic methods for meeting the prerequisite are shown in the following table along with the percent of the total (i.e. 547) this number represents.

Method Used to Satisfy the Prerequisite	Number of Students	Percent of Total N = 547
1. Completed Math 253 at Saddleback College or IVC	347	63.4%
2. Completed Intermediate Algebra at another College	21	3.8%
3. Completed Intermediate Algebra in High School	44	8.0%
4. Completed a Mathematics Course at a Level Higher than Intermediate Algebra	80	14.6%
5. Passed Matriculation Test: Intermediate Algebra	35	6.4%
6. Passed Matriculation Test: Precalculus	4	0.7%
7. Given this Level of Mathematics Placement at another College	4	0.7%
8. Either did not meet the Prerequisite or it was not possible to determine if the student met the Prerequisite	12	2.2%

In order to determine if the distribution of methods used to meet the prerequisite is similar for the three courses (i.e. Math 8, Math 10, and Math 124), the percent of the students in each course using each of these methods is shown in the table below.

	Percent of Students in Each Course Who Used a Particular Method to Satisfy the Prerequisite		
Method Used to Satisfy the Prerequisite	Math 8 N = 202	Math 10 N = 205	Math 124 N = 140
1. Completed Math 253 at Saddleback College or Irvine Valley College	69.8%	56.5%	64.3%
2. Completed Intermediate Algebra at another College	4.5%	2.9%	4.3%
3. Completed Intermediate Algebra in High School	7.9%	7.3%	9.3%
4. Completed a Mathematics Course at a Level Higher than Intermediate Algebra	8.4%	23.9%	10.0%
5. Passed Matriculation Test: Intermediate Algebra	6.4%	3.9%	10.0%
6. Passed Matriculation Test: Precalculus	1.0%	0.5%	0.7%
7. Given this Level of Mathematics Placement at another College	0.5%	1.0%	0.7%
8. Either did not meet the Prerequisite or it was not possible to determine if the student met the Prerequisite	1.5%	3.9%	0.7%

Probably the most striking feature of the distribution shown in the table above is that nearly one quarter of the Math 10 students have already completed a mathematics course at this level or higher. This increased level of preparation may contribute to the higher success rate of Math 10 students relative to Math 8 and Math 124 students observed in the discussion of "Question 1."

cc: Mathematics Department

To: Richard McCullough, Dean
Mathematics, Science, and Engineering Division

From: Steve Sworder, Instructor
Mathematics Department

Date: January 17, 1997

Subject: Fall 1996 Mathematics Prerequisite Review Question 3:

"What percent of students using the various methods available for meeting the prerequisite for Math 8, Math 10, and Math 124 for the Fall, 1996 semester successfully completed that course?"

The population of students on which the answer to this question is based consists of those students enrolled in Math 8, Math 10, and Math 124 who did not drop on or before the day of the first class meeting. The numbers enrolled in each of the courses of interest are:

Math 8	202 students
Math 10	205 students
Math 124	140 students

The students who successfully completed these courses are those who received a grade of A, B, C, CR, or I/C. The percent of those who successfully completed these courses, categorized by the method used to satisfy the course prerequisite, is simply the ratio of the number who used a particular method to satisfy the prerequisite and successfully completed the course to the number who used that particular method to satisfy the prerequiste. The results for each method for satisfying the prerequisite are shown below.

Method used by the student to satisfy the prerequisite	Percent of students using this method who successfully completed the course in which they enrolled
1. Completed Math 253 at Saddleback College or Irvine Valley College	39.5%
2. Completed Intermediate Algebra at another College	38.1%
3. Completed Intermediate Algebra in High School	65.9%
4. Completed a Mathematics Course at a Level Higher than Intermediate Algebra	58.8%
5. Passed Matriculation Test: Intermediate Algebra	71.4%
6. Passed Matriculation Test: Precalculus	75.0%
7. Given this Level of Mathematics Placement at another College	75.0
8. Either did not meet the Prerequisite or it was not possible to determine if the student met the Prerequisite	33.3%

In order to determine if the rates of success are uniform over the three courses (i.e. Math 8, Math 10, and Math 124), the percent of students successful in each course categorized by the method used to meet the prerequisite were calculated and placed in the table below.

	Percent of students who successfully completed the course in which they enrolled, categorized by the method used to satisfy the course prerequisite		
Method used to satisfy the prerequisite	Math 8	Math 10	Math 124
1. Completed Math 253 at Saddleback College or Irvine Valley College	37.6%	47.4%	32.2%
2. Completed Intermediate Algebra at another College	22.2%	66.7%	33.3%%
3. Completed Intermediate Algebra in High School	75.0%	86.7%	30.1%
4. Completed a Mathematics Course at a Level Higher than Intermediate Algebra	52.3%	61.2%	57.1%
5. Passed Matriculation Test: Intermediate Algebra	76.9%	50%	78.6%
6. Passed Matriculation Test: Precalculus	50.0%	100%	100%
7. Given this Level of Mathematics Placement at another College	0%	100%	100%
8. Either did not meet the Prerequisite or it was not possible to determine if the student met the Prerequisite	0%	37.5%	100%

Observations:

Looking back at the first table above, it is clearly disappointing that less than 40% of those students completing Intermediate Algebra (Math 253) at Saddleback College (or IVC) successfully complete their next mathematics course. Although little comfort, this success rate is slightly higher than the rate for those students who have taken intermediate algebra at another college. However, both of these rates pale in comparison to the success of students who completed the intermediate algebra course while in high school.

The success rate of our Math 253 students does not appear all that much better than those who enrolled without the prerequisite or without providing evidence that they met the prerequisite. This result should, however, not be granted too much significance. In all, twelve students fell into this latter category. Seven of these were allowed to repeat a course for which they had previously received a substandard grade (D or F). Some (or all) of these students might have met the prerequisite. They did not need to provide this information before enrolling and so it is unknown whether or not they met the prerequisite. Two of these students (28.6%) successfully completed the course in Fall, 1996. Another four students were enrolled by error without providing evidence that they met the prerequisite. One of these students (25%) was successful in Fall, 1996. One addition student filed an appeal in hopes that his grade of 1.5 in Algebra 2/Trigonometry from another institution would meet the prerequisite. This appeal was rejected because a 1.5 is less than the required grade of 2 '(i.e. C). By error, the student was allowed to register in Math 10 and he was successful in Fall, 1996

Looking at the second table presented above, we see that students who complete their intermediate algebra requirement at Saddleback College (or Irvine Valley College) have a much higher rate of success in Math 10 than either Math 8 or Math 124. Notice that the trigonometry course seems to be much more difficult than the college algebra for those who bring their prerequisite from high school. The intermediate algebra level matriculation test appears to be doing a very good job for students who wish to enroll in college algebra or trigonometry. Students who enroll in Math 10 after passing this test are successful at a slightly higher rate than those who completed Math 253 at Saddleback College (or Irvine Valley College).

cc: Mathematics Department

To: Richard McCullough, Dean
Mathematics, Science, and Engineering Division

Date: January 20, 1997

From: Steve Sworder, Instructor
Mathematics Department

Subject: Fall 1996 Mathematics Prerequisite Review Question 4:

> "Is there a relationship between the grade a student received in Math 253 at Saddleback College (or IVC) and the particular mathematics course (i.e. Math 8, Math 10, Math 124) in which that student enrolled during the Fall, 1996 term?"

The population of students on which the answer to this question is based consists of those 347 students enrolled in Math 8, Math 10, and Math 124 who did not drop on or before the day of the first class meeting and met the prerequisite for that course using completion of Math 253 at Saddleback College or Irvine Valley College. The numbers enrolled in each of the courses of interest are:

Math 8	141 students (40.6%)
Math 10	116 students (33.4%)
Math 124	90 students (25.9%)

The distribution of grades in Math 253 among these students is the following:

Grade of A in Math 253	70 students (20.2%)
Grade of B in Math 253	123 students (35.4%)
Grade of C in Math 253	139 students (40.1%)
Grade of CR in Math 253	15 students (4.3%)

The distribution of the percent of students with a particular Math 253 grade (i.e. A, B, C, CR) over the courses of interest (i.e. Math 8, Math 10, and Math 124) is shown in the following table. For example, we see in the first row of the table that 37.1% of students with an A in Math 253 enrolled in Math 8, 27.1% of students with an A in Math 253 enrolled in Math 10, and 35.7% of students with an A in Math 253 enrolled in Math 124.

Grade Received in Math 253	Percent of students with the indicated grade in Math 253 who enrolled in the specified course		
	Math 8	Math 10	Math 124
A	37.1%	27.1%	35.7%
B	45.5%	28.5%	26.0%
C	39.6%	39.6%	20.9%
CR	26.7%	46.7%	26.7%

Observation:

A rather surprising feature of the distribution shown in the table above is the large percent of C students that enroll in College Algebra (Math 8). This is the most difficult of the three courses. It meets 5 hours a week while the others meet only 3 hours. Further, it has the responsibility to prepare business students for the Brief Course in Calculus (Math 11). Consequently, its pace is relentless and the decision to enroll in this course should not be made casually. As would be expected, the percent of students enrolling in Trigonometry (Math 124) decreases as the Math 253 grade decreases and the percent of students enrolling in Statistics increases as the Math 253 grades decreases.

cc: Mathematics Department

To: Richard McCullough, Dean
Mathematics, Science, and Engineering Division

From: Steve Sworder, Instructor
Mathematics Department

Date: January 22, 1997

Subject: Fall 1996 Mathematics Prerequisite Review Question 5:

> "Is there a relationship between the grade a student received in Math 253 at Saddleback or Irvine Valley Colleges and successful completion of the particular mathematics course (i.e. Math 8, Math 10, Math 124) in which that student enrolled during the Fall, 1996 term?"

The population of students on which the answer to this question is based consists of those students enrolled in Math 8, Math 10, and Math 124 who did not drop on or before the day of the first class meeting and met the prerequisite for that course using completion of Math 253 at Saddleback College or Irvine Valley College. The numbers enrolled in each of the courses of interest are:

Math 8	141 students
Math 10	116 students
Math 124	90 students

The distribution of grades in Math 253 among these students is the following:

Grade of A in Math 253	70 students
Grade of B in Math 253	123 students
Grade of C in Math 253	139 students
Grade of CR in Math 253	15 students

The distribution of the percent of students who successfully completed the courses of interest (i.e. Math 8, Math 10, and Math 124) following receipt of the grade in Math 253 indicated is shown in the following table. Students were considered successful if they received a grade of A, B, C, CR, or I/C. For example, we see in the first row of the table that 61.5% of students with an A in Math 253 who enrolled in Math 8 successfully completed that course; 47.4% of students with an A in Math 253 who enrolled in Math 10 successfully completed that course; 44.0% of students with an A in Math 253 who enrolled in Math 124 successfully completed that course; and, altogether, 51.4% of students with an A in Math 253 successfully completed the course in which they enrolled.

Grade Received in Math 253	Percent of those students enrolled in each course with the indicated grade in Math 253 who successfully completed the Fall, 1996 course			
	Math 8	Math 10	Math 124	All Classes
A	61.5%	47.4%	44.0%	51.4%
B	37.5%	57.1%	28.1%	40.7%
C	29.1%	38.2%	24.1%	31.7%
CR	50.0%	71.4%	25.0%	53.3%

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Observation:

As would be expected, students with higher grades in Math 253 tend to do better in their subsequent math course. Notice how quickly the success rate falls off in the Math 8 course. While 61% of students with an A in Math 253 complete this course, the success rate for students with a C in Math 253 is less than half this level (i.e. 29%). It is not clear why Math 10 students with an A in Math 253 should have a lower completion rate than those with a grade of B. Notice that students with a C in Math 253 have a higher success rate in Math 10 than either Math 8 or Math 124. The success rates in Math 124 are dismal. As noted in the discussion for an earlier question, this may result from the need for a geometry component in the prerequisite or a need to modify the curriculum to compensate for the lack of geometry in the background of students who enroll in trigonometry.

cc: Mathematics Department

To: Richard McCullough, Dean
Mathematics, Science, and Engineering Division

Date: January 24, 1997

From: Steve Sworder, Instructor
Mathematics Department

Subject: Fall 1996 Mathematics Prerequisite Review Question 6:

"Is there a relationship between the grade a student received in Math 253 and a history of previous attempts at this course or one at the same or higher level at Saddleback or Irvine Valley Colleges and successful completion of the particular mathematics course (i.e. Math 8, Math 10, Math 124) in which that student enrolled during the Fall, 1996 term?"

The population of students on which the answer to this question is based consists of those students who successfully completed either Math 8, Math 10, or Math 124 during the Fall, 1996 semester and who met the prerequisite for that course using completion of Math 253 at Saddleback College or Irvine Valley College. Students were considered successful if they received a grade of A, B, C, CR, or I/C.

The distribution of the percent of students who had previously attempted the course in which they were enrolled for Fall, 1996 or one at the same or higher level is shown in the following table. Only those students who were unsuccessful in all previous attempts are counted in this group. For example, we see in the first row of the table that 6.3% of students with an A in Math 253 who successfully completed Math 8 had been unsuccessful in previous attempts in courses at this level or higher; 22.2% of students with an A in Math 253 who successfully completed Math 10 had been unsuccessful in previous attempts in courses at this level or higher; 18.2% of students with an A in Math 253 who successfully completed Math 124 had been unsuccessful in previous attempts in courses at this level or higher.

Grade Received in Math 253	Percent of students who were successful in Fall, 1996 and had received the indicated grade in Math 253; who had unsuccessfully taken a course at this level or higher in a previous term at Saddleback College (orIVC)		
	Math 8	Math 10	Math 124
A	6.3%	22.2%	18.2%
B	23.8%	20.0%	33.3%
C	62.5%	38.1%	57.1%
CR	50.0%	0%	0%

Observation:

Notice that nearly two-thirds of those who were successful in Math 8 after receiving a C in Math 253 had previously taken this course or one at the same level or higher. A similar situation exists for Math 124 students who entered after receiving a C in Math 253. Of those who were successful, 57% had already attempted this course or one at the same level or higher. Consequently, a student who meets the prerequisite with a C in Math 253 should expect to devote at least two semesters to the process of completing either Math 8 or Math 124.

In case you are interested, of the 547 students who enrolled in Math 8, Math 10, or Math 124 for the Fall 1996 term and did not drop on or before the day of the first class meeting, 138 (25.2%) had previously attempted the same course or one at the same level or higher at Saddleback College (or Irvine Valley College). Of this group of 138 students, 56 (40.6%) successfully completed the course in the Fall, 1996 term.

cc: Mathematics Department

To: Richard McCullough, Dean
Mathematics, Science, and Engineering Division

From: Steve Sworder, Instructor
Mathematics Department

Date: January 27, 1997

Subject: Fall 1996 Mathematics Prerequisite Review Question 7:

> "Using only those students who satisfied the prerequisite by completing Math 253 at Saddleback College (or Irvine Valley College), is the average Math 253 grade of these students the same for each class section of Math 8, Math 10, and Math 124 in Fall, 1996?"

The population of students on which the answer to this question is based consists of the 347 students enrolled in Math 8, Math 10, and Math 124 who did not drop on or before the day of the first class meeting and met the prerequisite for that course using completion of Math 253 at Saddleback College or Irvine Valley College. The average Math 243 grade earned by these students is 2.70 .

The distribution of the average Math 253 grade over each Math 8, Math 10, and Math 124 class section offered in the Fall, 1996 term is shown in the table below. The numerical equivalents used for letter grades are the following:

A = 4 B = 3 C = 2 CR = 2

The class sections are listed in the table by ticket number. The corresponding scheduled days and time are the following:

Math 8	16815	MWF	10:30am	to	12:00n
Math 8	16820	MWF	12:00n	to	1:30pm
Math 8	16825	TTh	8:00am	to	10:30am
Math 8	16830	TTh	4:30pm	to	7:00pm
Math 10	16855	MW	12:00n	to	1:30pm
Math 10	16860	TTh	9:00am	to	10:30am
Math 10	16865	TTh	10:30am	to	12:00n
Math 10	16870	Th	7:00pm	to	10:00pm
Math 124	16905	MW	12:00n	to	1:30pm
Math 124	16910	TTh	10:30am	to	12:00n
Math 124	16915	W	7:00pm	to	10:00pm

Course	Ticket Number	Class Meetings per Week	Average Math 253 Grade
Math 8	16815	3	2.64
Math 8	16820	3	2.52
Math 8	16825	2	2.71
Math 8	16830	2	3.05
Math 10	16855	2	2.50
Math 10	16860	2	2.59
Math 10	16865	2	2.63
Math 10	16870	1	2.79
Math 124	16905	2	2.83
Math 124	16910	2	3.00
Math 124	16915	1	2.94

Observation:

The greatest variation in entering average Math 253 grade appears in the Math 8 course. Notice that the classes that meet only twice a week have a higher average than those meeting three days a week. This is appropriate since the weaker students should benefit from more frequent personal contact with the class and instructor. The average Math 253 grade for the students in both of the 3 day per week sections is below the average grade of 2.70 for the 347 students in the population. The night Math 8 has the highest average Math 253 grade of any section in this study.

The variation among the Math 10 sections is small and all but the night section have an average grade less than the population average of 2.70 While the average Math 253 grade of these sections appears low, recall that nearly one quarter of the students in Math 10 met the prerequisite with successful completion of a course at a level higher than intermediate algebra. Those students do not appear in the table above. This fact has the potential of creating the interesting situation of the combination of rather weak intermediate algebra students and students who have been successful in a mathematics course at a level higher than intermediate algebra. As it turns out, if we compare the number of students in a class section who used intermediate algebra from Saddleback College to gain entry (denoted IntAlg) and the number who used completion of a course at a level higher than intermediate algebra (denoted Higher) by calculating the ratio: IntAlg to Higher; the ratio generally decreases as the average grade of our former intermediate algebra students increases. This is shown in the table below:

Course	Ticket Number	Class Meetings per Week	Average Math 253 Grade	Ratio of IntAlg to Higher
Math 10	16855	2	2.50	2.36 to 1
Math 10	16860	2	2.59	3.56 to 1
Math 10	16865	2	2.63	2.14 to 1
Math 10	16870	1	2.79	1.87 to 1

Consequently, the sections that are more influenced by the presence of students who have completed a mathematics course at a level higher than intermediate algebra also have the better group of former intermediate algebra students. Makes one think about teaching a night section of Math 10 next year?

The variation of the average Math 253 grade among the Math 124 sections is also fairly small. The average Math 253 grade of the trigonometry sections is higher, as a group, than either Math 10 or Math 8 and well above the population average of 2.70. This fact makes the low success rate for Math 124 students all the more disturbing.

cc: Mathematics Department

To: Richard McCullough, Dean
Mathematics, Science, and Engineering Division
Date: January 29, 1997
From: Steve Sworder, Instructor
Mathematics Department

Subject: Fall 1996 Mathematics Prerequisite Review Question 8:

> "For those Math 8, Math 10, and Math 124 students who satisfied the prerequisite by completing Math 253 (Intermediate Algebra) at Saddleback College (or IVC) and had not previously attempted this course or a course at the same or higher level, does the rate of success decline as the time since the completion of Math 253 increases?"

The population of students on which the answer to this question is based consists of the 244 students enrolled in Math 8, Math 10, and Math 124 who did not drop on or before the day of the first class meeting and met the prerequisite for that course using completion of Math 253 at Saddleback College or Irvine Valley College and who had not previously attempted Math 8, Math 9, Math 10, or Math 124 or a course at a higher level at Saddleback College or Irvine Valley College.

In the table below is shown the number of students enrolled in Math 8, Math 10, and Math 124 for Fall, 1996 categorized by the term in which they completed Math 253. Also shown is the percent of students in each of these categories who successfully completed the Fall, 1996 course. For example, in the first line of this table we see that 40 students in this population had completed Math 253 during the Summer, 1996 term and 43% of this group successfully completed the course in which they enrolled for Fall, 1996

Term in which Math 253 was completed	Number of students enrolled in Fall, 1996	Percent of students who were successful in Fall, 1996
Summer, 1996	40	43%
Spring, 1996	133	41%
Fall, 1995	32	50%
Summer, 1995	3	33%
Spring, 1995	14	29%
Fall, 1994	10	40%
Spring, 1994	2	0%
Fall, 1993	1	100%
Spring, 1993	1	0%
Fall, 1992	1	0%
Spring, 1992	1	0%
Fall, 1991	1	100%
Summer, 1991	1	0%
Spring, 1991	1	100%
Fall, 1988	1	100%
Spring, 1987	1	0%
Spring, 1985	1	0%

In the tables below are shown the number of students enrolled in Math 8, Math 10, and Math 124 for Fall, 1996 categorized by the term in which they completed Math 253. A separate table has been created for each course. Also shown is the percent of students in each of these categories who successfully completed the Fall, 1996 course. For example, in the first line of the Math 8 table we see that 14 students had completed Math 253 during the Summer, 1996 term and 36% of this group successfully completed Math 8 during Fall, 1996.

Math 8: College Algebra

Term in which Math 253 was completed	Number of students enrolled in Math 8 Fall, 1996	Percent of students who were successful in Fall, 1996
Summer, 1996	14	36%
Spring, 1996	55	38%
Fall, 1995	8	63%
Summer, 1995	1	100%
Spring, 1995	8	25%
Fall, 1994	5	40%
Fall, 1993	1	100%
Spring, 1993	1	0%
Fall, 1992	1	0%
Spring, 1992	1	0%
Fall, 1991	1	100%
Summer, 1991	1	0%
Fall, 1988	1	100%
Spring, 1987	1	0%
Spring, 1985	1	0%

Math 10: Introduction to Statistics

Term in which Math 253 was completed	Number of students enrolled in Math 10 Fall, 1996	Percent of students who were successful in Fall, 1996
Summer, 1996	12	33%
Spring, 1996	50	44%
Fall, 1995	15	67%
Summer, 1995	1	0%
Spring, 1995	2	100%
Fall, 1994	2	100%
Spring, 1994	2	0%
Spring, 1991	1	100%

Math 124: Trigonometry

Term in which Math 253 was completed	Number of students enrolled in Math 124 Fall, 1996	Percent of students who were successful in Fall, 1996
Summer, 1996	14	50%
Spring, 1996	28	39%
Fall, 1995	9	33%
Summer, 1995	1	0%
Spring, 1995	4	0%
Fall, 1994	3	0%

Observation:

Looking at the first table above that combines the results for Math 8, Math 10, and Math 124 there does not appear to be a significant relationship between student success and the time that has past since Math 253 was completed. The answer to the original research question appears to be "No."

A few interesting patterns do emerge when the results for the individual courses are examined. The Math 8 students completed the Math 253 over a wide span of years and that time was not a good indicator of future success. The relationship for Math 10 is essentially an inverse one. Apparently (with some humor intended) the more time the students had to forget their experiences in Math 253, the more likely they were to be successful in Statistics. The situation is far different for Math 124 students. The success rate in Trigonometry declines rapidly as time since Math 253 was completed increases and apparently encounters a wall at one year. None of the eight students who had completed Math 253 during the Summer, 1995 term or earlier were successful.

cc: Mathematics Department

To: Richard McCullough, Dean
Mathematics, Science, and Engineering Division

Date: January 31, 1997

From: Steve Sworder, Instructor
Mathematics Department

Subject: Fall 1996 Mathematics Prerequisite Review Question 9:

> "For those Math 8, Math 10, and Math 124 students who satisfied the prerequisite by passing the Matriculation Intermediate Algebra test, does the rate of success in Fall, 1996 decline as the time since the test was passed has increased?"

The population of students on which the answer to this question is based consists of the 35 students enrolled in Math 8, Math 10, and Math 124 who did not drop on or before the day of the first class meeting and met the prerequisite for that course using the Matriculation Intermediate Algebra test. Six members of this group had previously been unsuccessful in at least one attempt at a course at this level or higher. Five of these six successfully completed the course in which they enrolled for Fall, 1996.

In the table below is shown the number of students enrolled in Math 8, Math 10, and Math 124 for Fall, 1996 categorized by the term in which they passed the Matriculation test. Also shown is the percent of students in each of these categories who successfully completed the Fall, 1996 course. For example, in the first line of this table we see that 11 students passed the test during the Summer, 1996 term and 55% of this group successfully completed the course in which they enrolled for Fall, 1996

Term in which the Matriculation test was passed	Number of students enrolled in Fall, 1996	Percent of students who were successful in Fall, 1996
Summer, 1996	11	55%
Spring, 1996	10	90%
Fall, 1995	-	-
Summer, 1995	5	80%
Spring, 1995	4	25%
Fall, 1994	-	-
Summer, 1994	2	100%
Spring, 1994	1	100%
Fall, 1993	1	100%
Summer, 1993	-	-
Spring, 1993	1	0%

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In the tables below are shown the number of students enrolled in Math 8, Math 10, and Math 124 for Fall, 1996 categorized by the term in which they completed the Matriculation test. A separate table has been created for each course. Also shown is the percent of students in each of these categories who successfully completed the Fall, 1996 course. For example, in the first line of the table below we see that 5 students had passed the Matriculation test during the Summer, 1996 term and 60% of this group successfully completed Math 8 during the Fall, 1996 term.

Math 8: College Algebra

Term in which the Matriculation test was passed	Number of students enrolled in Math 8 Fall, 1996	Percent of students who were successful in Fall, 1996
Summer, 1996	5	60%
Spring, 1996	3	100%
Fall, 1995	-	-
Summer, 1995	2	50%
Spring, 1995	1	0%
Fall, 1994	-	-
Summer, 1994	-	-
Spring, 1994	1	100%
Fall, 1993	1	100%

Math 10: Introduction to Statistics

Term in which the Matriculation test was passed	Number of students enrolled in Math 10 Fall, 1996	Percent of students who were successful in Fall, 1996
Summer, 1996	2	0%
Spring, 1996	-	-
Fall, 1995	-	-
Summer, 1995	2	100%
Spring, 1995	2	50%
Fall, 1994	-	-
Summer, 1994	1	100%
Spring, 1994	-	-
Fall, 1993	-	-
Summer, 1993	-	-
Spring, 1993	1	0%

Math 124: Trigonometry

Term in which the Matriculation test was passed	Number of students enrolled in Math 124 Fall, 1996	Percent of students who were successful in Fall, 1996
Summer, 1996	4	75%
Spring, 1996	7	86%
Fall, 1995	-	-
Summer, 1995	1	100%
Spring, 1995	1	0%
Fall, 1994	-	-
Summer, 1994	1	100%

Observation:

Looking at the first table above that combines the results for Math 8, Math 10, and Math 124 there does not appear to be a significant relationship between student success and the time since the Matriculation test was passed. The answer to the original research question appears to be "No." This same result appears to apply to each of the courses individually.

cc: Mathematics Department

To: Richard McCullough, Dean
Mathematics, Science, and Engineering Division

From: Steve Sworder, Instructor
Mathematics Department

Date: February 3, 1997

Subject: Fall 1996 Mathematics Prerequisite Review Question 10:

> "For those Math 8, Math 10, and Math 124 students who satisfied the prerequisite by passing the Matriculation Intermediate Algebra test, does the rate of success in Fall, 1996 increase as the student test scores increase?"

The population of students on which the answer to this question is based consists of the 35 students enrolled in Math 8, Math 10, and Math 124 who did not drop on or before the day of the first class meeting and met the prerequisite for that course using the Matriculation Intermediate Algebra test. Six members of this group had previously been unsuccessful in at least one attempt at a course at this level or higher. Five of these six successfully completed the course in which they enrolled for Fall, 1996.

In the table below is shown the number of students enrolled in Math 8, Math 10, and Math 124 for Fall, 1996 categorized by their score on the Matriculation test. Also shown is the percent of students in each of these categories who successfully completed the Fall, 1996 course. For example, in the second line of this table we see that 3 students passed the test with a score of 26 and 67% of this group successfully completed the course in which they enrolled for Fall, 1996

Score on the Matriculation Intermediate Algebra Test	Number of students enrolled in Fall, 1996	Percent of students who were successful in Fall, 1996
25	1	0%
26	3	67%
27	7	57%
28	7	71%
29	3	67%
30	6	67%
31	1	0%
32	2	100%
34	2	100%
36	1	100%
39	1	100%
45	1	100%

In the tables below are shown the number of students enrolled in Math 8, Math 10, and Math 124 for Fall, 1996 categorized by their score on the Matriculation Intermediate Algebra test. A separate table has been created for each course. Also shown is the percent of students in each of these categories who successfully completed the Fall, 1996 course. For example, in the first line of the table below we see that 1 student scored 25 on the test but failed to successfully complete Math 8 during the Fall, 1996 term.

Math 8: College Algebra

Score on the Matriculation Intermediate Algebra Test	Number of students enrolled in Math 8 Fall, 1996	Percent of students who were successful in Fall, 1996
25	1	0%
26	1	100%
27	2	50%
28	4	75%
29	2	50%
30	1	100%
32	1	100%
45	1	100%

Math 10: Introduction to Statistics

Score on the Matriculation Intermediate Algebra Test	Number of students enrolled in Math 10 Fall, 1996	Percent of students who were successful in Fall, 1996
26	1	0%
27	3	33%
28	2	100%
31	1	0%
36	1	100%

Math 124: Trigonometry

Score on the Matriculation Intermediate Algebra Test	Number of students enrolled in Math 124 Fall, 1996	Percent of students who were successful in Fall, 1996
26	1	100%
27	2	100%
28	1	0%
29	1	100%
30	5	60%
32	1	100%
34	2	100%
39	1	100%

Observation:

Generally, the higher the student scores on the Matriculation test, the more likely that student is to be successful in Math 8, Math 10, and Math 124. The average score of students who enrolled using the Matriculation test to satisfy the prerequisite is 29.7 and the average score of those who were successful in Fall, 1996 is 30.4 The average score of students who enrolled in Math 8 is 29.4 and the average score of those successful in Math 8 is 30.3 The average score of students who enrolled in Math 10 is 28.8 and the average score of those successful in Math 10 is 29.8 The average score of students who enrolled in Math 124 is 30.4 and the average score of those successful in Math 124 is 30.7

cc: Mathematics Department

To: Richard McCullough, Dean
Mathematics, Science, and Engineering Division

From: Steve Sworder, Instructor
Mathematics Department

Date: February 5, 1997

Subject: Fall 1996 Mathematics Prerequisite Review Question 11:

"For those Math 8, Math 10, and Math 124 students who completed the prerequisite while in high school, from what high schools did they come?

The population of students on which the answer to this question is based consists of the 44 students enrolled in Math 8, Math 10, and Math 124 who did not drop on or before the day of the first class meeting and met the prerequisite for that course while in high school.

In the table below is shown the number of students who completed the prerequisite at our local high schools. Further is shown the percent of students from each high school who were successful in the mathematics course in which they enrolled. For example, the first line of the table below reveals that 3 students met the prerequisite while attending Aliso Niguel High School and 67% of these students were successful in their Fall, 1996 course. Those high schools that were out of district and provided only one student each were collected together in the "Others" category.

High School	Number of students enrolled in Fall, 1996	Percent of students who were successful in Fall, 1996
Aliso Niguel	3	67%
Capistrano Valley	3	100%
Dana Hills	4	50%
El Toro	1	100%
Laguna Beach	1	100%
Laguna Hills	5	80%
Mission Viejo	4	25%
San Clemente	4	75%
Santa Margarita	3	100%
Trabuco Hills	2	0%
Tustin	2	50%
Others	12	67%

cc: Mathematics Department